CLAIMS

1. A method for measuring a deformation of a system by

- introducing into the system, alternatively assigning to the system, a probe capable of at least exhibiting an elastic deformation,
- introducing into at least part of the probe a non-metallic conductor for conducting an electrical current,
- providing into the non-metallic conductor a plurality of electrodes being electrically connected through the non-metallic conductor and being applied an electrical potential,
- measuring the electrical potential difference between at least two of the number of electrodes for determining an actual electrical impedance of the non-metallic conductor between the at least two electrodes, and
- said present electrical impedance, in correlation with an empirically determined electrical impedance of the non-metallic conductor between the at least two electrodes, being indicative of a deformation such as an extension or contraction of the system.

2. A method for measuring a deformation of a system by

- introducing into the system, alternatively assigning to the system, a probe capable of at least exhibiting an elastic deformation,
- introducing into, alternatively assigning to, at least part of the probe a metallic conductor for conducting an electrical current,
- providing at last at two points along the metallic conductor an electrical connection at aech of said at least two points and said points being applied an electrical potential,
- measuring the electrical potential difference between the at least two of a number of points for determining an actual electrical impedance of the metallic conductor between the at least two points, and
- said present electrical impedance, in correlation with an empirically determined electrical impedance of the metallic conductor between the at least two points, being indicative of a deformation such as an extension or contraction of the system.

3. A method according to claim 1 or claim 2, where said deformation of the system is indicative of a force of a certain magnitude being applied to the probe between the at least two of the number of electrodes or points.

4. A method according to claim 1 or claim 2, where said deformation of the system is indicative of a change in distance of a certain magnitude being applied to the probe between the at least two of the number of electrodes or points.

5. A method according to claim 1 or claim 2, where said deformation of the system is indicative of an acceleration of a certain magnitude being applied to the probe between the at least two of the number of electrodes or points.

6. A method according to claim 1 or claim 2, where said deformation of the system is indicative of a velocity of a certain magnitude being applied to the probe between the at least two of the number of electrodes or points.

7. A method according to any of claims 1-6, where said electrical impedance is being measured initial to introducing or assigning the probe into or to the system.

8. A method according to any of claims 1-6, where said electrical impedance is being measured subsequent to extracting or removing the probe from the system.

9. A method according to any of claims 1-8, where the empirically determined electrical impedance correlates to a corresponding empirically determined force applied to the probe between the at least two of the number of electrodes or points.

10. A method according to any of claims 1-8, where the empirically determined electrical impedance correlates to a corresponding empirically determined distance between the at least two of the number of electrodes or points.

11. A method according to any of claims 1-8 and 9, where the empirically determined force, alternatively the empirically determined distance, is a force or a distance between the at least two of the number of electrodes, alternatively the at least two number of points, measured subsequent to introducing or assigning the probe, said empirical distance measured initially to measuring the actual distance.

12. A method according to any of claims 1-8 and 10, where the empirically determined force, alternatively the empirically determined distance, is a force or a distance between the at least two of the number of electrodes, alternatively the at least two number of points, measured subsequent to introducing or assigning the probe, said empirical distance measured subsequently to measuring the actual distance.

13. A method according to any of claims 1-9, where the forces, the distances, the acceleration or the speed measured between the at least two electrodes or points are forces or distances along a substantial longitudinal extension of the probe.

14. A method according to any of claims 1-9, where the forces, the distances, the acceleration or the speed measured between the at least two electrodes or points are forces or distances along a substantial circumferential extension of the probe.

15. A method according to any of claims 1-9, where the forces, the distances, the acceleration or the speed measured between the at least two electrodes or points are forces or distances along a substantial transverse extension of the probe.

16. A method according to any of claims 1-15, where the method is intended for measuring a physical reaction of a person or an animal by introducing the probe into a bodily system of the person or the animal, possibly by introducing a probe from an exteriorly accessible opening of a bodily hollow system, alternatively by assigning the probe to a body part of the person or the animal.

17. A method according to claim 1 and any of claims 3-15, where the method comprises introducing into at least part of the probe a fluid non-metallic conductor for conducting an electrical current, and said method comprising establishment of a flow of the non-metallic conductor through the probe in order to provide a continuous introduction and extraction of fluid non-metallic conductor to and from the probe, respectively.

18. A method according to any of claims 1-17, where the method comprises introducing into at least part of the probe a solid conductor for conducting an electrical current, and said method comprising an integration of the conductor and the material, which the probe is made of in order to provide a probe, the material of which in itself containing the solid conductor.

19. A method according to any of claims 1-17, where the method comprises introducing into at least part of the probe a solid conductor for conducting an electrical current, and said method comprising an integration of the conductor and the material, which the probe is made of in order to provide a probe, the material of which in itself being the solid conductor.

20. A method according to any of claims 1-17, where the method comprises introducing into at least part of the probe a solid conductor for conducting an electrical current, and said method comprising an integration of the conductor and any lumen, which the probe is provided with in order to provide a probe, at least one lumen of which containing the solid conductor.

21. A method according to any of claims 1-20, where said probe is being provided with at least one inflatable balloon situated between a proximal end and a distal end of the probe, and where the method comprises the further step of inflating the at least one balloon, until the balloon abuts an inner wall of the system in order for the balloon and the probe to be fixed longitudinally in relation to the system.

22. A method according to claim 21, where the method comprises the further step of introducing into at least part of the probe, either before inflation, during inflation or subsequent to inflation of the at least one balloon, the non-metallic conductor for conducting an electrical current.

23. A method according to any of claims 1-22, said measuring taking place by also attaching to the surface of the probe, possibly attaching to the surface of the balloon, a number of the following further measuring means: strain gauges, pressure gauges, temperature gauges, piezo-electrical gauges, laser Doppler flowmetric sensors, electrodes, pH-recording means, and electromyographic (EMG) recording means.

24. A method according to any of claims 1-23, said measuring taking place by also introducing into the probe, possibly introducing into the balloon, a number of the following further measuring means: pressure gauges, temperature gauges, visualizational recording means, means for recording flow of fluid.

25. A method according to any of claims 1-24, said measuring taking place by also applying outside the probe, possibly applying outside the balloon, a number of following further measuring means: ultrasonic measuring means, visualizational recording means, scanning means, means for recording flow of fluid and tissue perfusion.

26. A method according to any of claims 1-25, where said empirical distance is measured during no subjection of a number of selected stimuli, and where the actual distance is measured during subjection of a number of selected stimuli.

27. A method according to any of claims 1-25 and according to claim 26, said measuring taking place by assigning, subsequent to the introduction or the assigning of the probe to the system, and in the alternative during, possibly also subsequent to, the inflation of the balloon, a number of the following measuring means for measuring the sensation felt by the patient of any of the stimuli being subjected: automatically operated scales, manually operated scales and personal written or orally expressions.

28. A method according to claim 21 or 22, where a mechanical measurement is performed when the balloon is inflated thereby introducing a change in pressure of the balloon, said pressure being indicative of the circumferential tension applied by the balloon to an internal wall of the system, and where the deformation of the system is measured by way of the electrodes or at the points with knowledge of the pressure inside the balloon.

29. A method according to claim 21 or 22, where a measurement during mechanical stimulus is performed, when the balloon is inflated thereby introducing a change in volume of the balloon, said volume being indicative of the circumferential tension applied by the balloon to an internal wall of the system, and where the deformation of the system is measured by way of the electrodes or by the points with knowledge of the volume of the balloon.

30. A method according to claim 21 or 22, where a measurement during mechanical stimulus is performed, when the balloon is inflated thereby introducing a change in cross-sectional area of the balloon, said area being indicative of the circumferential tension applied by the balloon to an internal wall of the system, and where the deformation of the system is measured by way of the electrodes or by the points with knowledge of the cross-sectional area of the balloon.

31. A method according to any of claims 1-30, where a measurement during thermal stimulus is performed, when the probe is filled with a fluid, preferably a liquid, said liquid introducing a change in temperature of the probe and thus of an outer surface of the probe, said outer surface being a surface abutting the inner wall of the system, and where the deformation of the system is measured by way of the electrodes or by the points with knowledge of the temperature of the fluid inside the probe.

32. A method according to any of claims 1-31, where a measurement during chemical stimulus is performed, when passing of a chemical substance through a number of the canals inside the probe to a number of openings in side-walls of the probe and out into the hollow system, and where the extension or the contraction of the hollow system is measured by way of the electrodes or by the points with knowledge of the composition of the chemical substance.

33. A method according to claim 32, where the chemical substance is a substance commonly present in the bodily hollow system being measured, such as an acid like HCl in the esophagus, or such as bile salts in the gall bladder, or such as water with NaCl.

34. A method according to claim 32, where the chemical substance is a pharmaceutical substance intended for treatment of diseases in the bodily system being measured, such as smooth muscles relaxants.

35. A method according to claim 32, where the chemical substance is a substance having special technical or physical properties such as a contrast fluid intended for co-operation with an exterior measuring means such as an X-ray apparatus.

36. A method according to any of claims 32-35, where the method is performed for measuring the passage of the chemical substance past a part of the probe abutting the internal wall of the system, said passage being indicative of the ability of the system to exercise a restraining influence, alternatively to exercise a passing influence, on liquids and solids.

37. A method according to any of claims 1-36, where a measurement during an electrical stimulus is performed, when passing an electrical current through a number of wires in a number of the canals inside the probe, and when passing the electrical current to an outer surface of the probe, said outer surface being a surface abutting the inner wall of the hollow system, and where the extension or the contraction of the hollow system is measured by way of the electrodes or by the points with knowledge of the magnitude of the electrical current applied.

38. A method according to claim 37, where the electrical current is applied during a certain interval of time, and where the extension or the contraction of the hollow system is measured by way of the electrodes or by the points with knowledge of the magnitude of the time interval, when the electrical current is applied.

39. A method according to claim 37, where the electrical current is applied at a certain frequency of time, and where the longitudinal extension of the hollow system is measured by way of the electrodes or by the points with knowledge of the frequency of time, at which the electrical current is applied.

40. A method according to any of the claims 16-39, wherein the method is performed anywhere in one of the following bodily systems: the muscles, the connective tissue, the skin, the bones, or where the method is performed anywhere in one of the following bodily hollow systems: the digestive system including the stomach, the urogenital tract including the bladder, the cardiovascular system including the heart, the lymph system, the ear canal including the eustachian canal and the posterior nares.

41. An apparatus for deformation of a system, said apparatus comprising a probe,
- said apparatus comprising a non-metallic conductor for conducting electric currents, and a plurality of electrodes being electrically connected through the non-metallic conductor,
- said apparatus furthermore comprising means for measuring the electrical potential difference between at least two of the number of electrodes for determining an actual electrical impedance of the non-metallic conductor between the at least two electrodes.

42. An apparatus for deformation of a system, said apparatus comprising a probe,
- said apparatus comprising a metallic conductor for conducting electric currents, and a plurality of points being electrically connected along the metallic conductor,
- said apparatus furthermore comprising means for measuring the electrical potential difference between at least two of the number of points for determining an actual electrical impedance of the metallic conductor between the at least two points.

43. An apparatus according to claim 41 or claim 42, said apparatus comprising means intended for measuring an actual distance between the at least two electrodes or points, said actual distance in correlation with an empirical determined distance being indicative of a deformation of the system.

44. An apparatus according to claim 41 or claim 42, said apparatus comprising means intended for measuring an actual distance between the at least two electrodes or points, said actual distance in correlation with an empirical determined distance being indicative of a force of a certain magnitude being applied to the probe.

45. An apparatus according to claim 41 or claim 42, said apparatus comprising means intended for continuous measuring of an actual distance between the at least two electrodes or points, said actual distance in correlation with an empirical determined distance and in correlation with an amount of time, during which the continuous measuring of the actual distance is taking place, is indicative of an acceleration of a certain magnitude being applied to the probe.

46. An apparatus according to claim 41 or claim 42, said apparatus comprising means intended for measuring of an actual distance between the at least two electrodes or points, said actual distance in correlation with an empirical determined distance and in correlation with an amount of time, after which the measuring of the actual distance is taking place, is indicative of a velocity of a certain magnitude being applied to the probe.

47. An apparatus according to any of claims 41-46, where the forces, the distances, the acceleration or the velocity, which said means are intended for measuring, between the at

least two electrodes or points, are forces, distances, acceleration or velocity along a substantial longitudinal extension of the probe.

48. An apparatus according to any of claims 41-46, where the forces, the distances, the acceleration or the velocity, which said means are intended for measuring between the at least two electrodes or points, are forces, distances, acceleration or velocity along a substantial circumferential extension of the probe.

49. An apparatus according to any of claims 41-46, where the forces, the distances, the acceleration or the velocity, which said means are intended for measuring between the at least two electrodes or points, are forces, distances, acceleration or velocity along a substantial transverse extension of the probe.

50. An apparatus according to claim 41 and any of claims 43-49, where the non-metallic conductor is a liquid serving as an electrolyte for conducting the electric current between the electrodes.

51. An apparatus according to claim 50, where the non-metallic conductor is a liquid preferably non-harmful to the bodily hollow system or the engineered structure being stimulated, such as an acid like HCl in the esophagus, or such as bile salts in the small intestine, or such as water with NaCl.

52. An apparatus according to claim 41 and any of claims 43-49, where the non-metallic conductor is a gas serving as a conductor for conducting the electric current between the electrodes.

53. An apparatus according to claim 52, where the non-metallic conductor is a gas preferably non-harmful to the bodily hollow system being stimulated, such as compounds including at least one nobel gas, i.e. helium, neon, argon, krypton, xenon, and radon.

54. An apparatus according to claim 41 and any of claims 43-49, where the non-metallic conductor is a solid serving as a conductor for conducting the electric current between the electrodes.

55. An apparatus according to claim 54, where the non-metallic conductor is a solid preferably non-harmful to the bodily hollow system being stimulated, such as compounds including at least one substance selected from: polymers, ceramics, composites and natural materials.

56. An apparatus according to any of claims 41-55, said apparatus being provided with at least one inflatable balloon situated between a proximal end and a distal end of the probe, and the apparatus comprising means for passing an inflating fluid, preferably a liquid, more preferred an electrolyte, from the proximal end to the balloon, and where the apparatus is provided with means for measuring at least one of the following physical properties of the balloon: the volume of the balloon, the cross-sectional area of the balloon seen in a direction parallel to the a longitudinal extension of the system, when the apparatus is introduced into or assigned to the system, the diameter of the balloon in a plane perpendicular to a longitudinal extension of the system, when the apparatus is introduced into or assigned to the system, the tension of the balloon, the strain of the balloon, the pressure of a fluid inside the balloon, and the temperature of a fluid inside the balloon

57. An apparatus according to any of claims 41-56, said apparatus having a number of further measuring means attached to the probe, possibly attached to the balloon, said measuring means being chosen among the following means: strain gauges, pressure gauges, temperature gauges, piezo-electrical gauges, electrodes, pH-recording means, and electromyographic (EMG) recording means.

58. An apparatus according to any of claims 41-57, said apparatus having a number of further measuring means inserted into the probe, possibly inserted into the balloon, said measuring means being chosen among the following means: pressure gauges, temperature gauges, ultrasonic measuring means, laser Doppler flow devices, visualizational recording means, means for recording flow of fluid.

59. An apparatus according to any of claims 41-58, said apparatus having a number of further measuring means assigned to the probe outside the probe, said measuring means being chosen among the following means: ultrasonic measuring means, visualizational recording means, scanning means, means for recording a flow of fluid.

60. An apparatus according to any of claims 41-59, said apparatus having assigned to the probe, possibly having assigned to the balloon, a number of the following measuring means for measuring the sensation felt by the patient of any of the stimuli being subjected: automatically operated scales, manually operated scales and personal written or orally expressions.

61. Use of an apparatus according to any of claims 41-60, said use taking place when a bodily hollow system of a person or an animal is being subjected to a number of artificially

applied stimuli, said stimuli being any of the stimuli: mechanical stimulus, thermal stimulus, chemical stimulus and electric stimulus.

62. Use of an apparatus according to any of claims 41-60 for performing measurements in part of the digestive system including the stomach, preferably performing measurements in the gastrointestinal tract based on a prior stimulation of any of the following kinds: mechanical stimulus, thermal stimulus, chemical stimulus and electric stimulus.

63. Use of an apparatus according to any of claims 41-60 for performing measurements in part of the urogenital system of a person or an animal, said urogenital system including the urinary bladder based on a prior stimulation of any of the following kinds: mechanical stimulus, thermal stimulus, chemical stimulus and electric stimulus.

64. Use of an apparatus according to any of claims 41-60 for performing measurements in part of the cardiovascular system of a person or an animal, said cardiovascular system including the heart and the lymph system, based on a prior stimulation of any of the following kinds: mechanical stimulus, thermal stimulus, chemical stimulus and electric stimulus.

65. Use of an apparatus according to any of claims 41-60 for performing measurements in part of the tissue of a person or an animal, said tissue including epitheliuous tissue, connective tissue, skin, and adipose tissue, based on a prior stimulation of any of the following kinds: mechanical stimulus, thermal stimulus, chemical stimulus and electric stimulus.

66. Use of an apparatus according to any of claims 41-60 for performing measurements in part of the motoric system of a person or an animal, said motoric system including the muscles and the bones, based on a prior stimulation of any of the following kinds: mechanical stimulus, thermal stimulus, chemical stimulus and electric stimulus.

67. Use of an apparatus according to any of claims 41-60 for performing measurement in non-human and non-animal systems such as in plants and in engineered structures.